Midterm Results
Animals

- Search and rescue dogs -- http://www.sardogsus.org/

![Image of a search and rescue dog in the snow with a 'SEARCH' vest.]
Dog Tricks

HOW TO TRAIN YOUR DOG: THE CHANGING WISDOM

Ancient Rome through the 19th century:
A wild spirit that needs to be "broken."

1800s: Training approached more scientifically
"All knowledge that is not beaten into a dog is worthless for all practical purposes."

1930s: "Train your dog"
No treats, but it's OK to praise. Mostly negative reinforcement.

1960s:
Training is a battle of wills
The greatest cruelty is "under-correction."

Early 1980s: "Dog-friendly dog training"
Puppy socialization, off-leash training, and the lavish use of food rewards.

1990s: A more positive approach
Ignore mistakes, reward good behavior.

2010: "Click and treat" vs. dominance theory
Are animals our equal partners, or are they inferior to their human masters?

Images from Thinkstock and Getty.
Appetitive Conditioning

- **Appetitive** – something desirable for survival that results in approach behavior.
- **Aversive** – something undesirable for survival that results in avoidance or escape behavior.
- Neuroscientists believe there are underlying appetitive and aversive motivational systems in the brain.
What is a Reinforcer?

- S-R learning
  - What is a contingency?
  - Thorndike’s idea of reward.
- B.F. Skinner
- Reinforcer – any response that increases the likelihood of a behavior.
  - Something reinforcing to one person may not be to another.
Instrumental vs Operant

- Both terms refer to voluntary behavior and S-R learning.
- **Instrumental conditioning** – the environment limits opportunities for reward.
- **Operant conditioning** – no limit on the amount of reinforcement that can be earned through behavior.
Runway Mazes (Instrumental)

Figure 6.1  (a) A simple T-maze. In this maze, the rat must learn whether to turn left or right to obtain reward. (b) A runway or alley. In this apparatus, the rat receives a reward when it reaches the goal box; latency to run down the alley is the index of performance.
Skinner’s Operant Chamber

- Some behavior that can be done to obtain reward.
  - Rate measured by experimenter.
- A dispenser of food or liquid used as a reinforcer (reward).
- Tones or lights to signal availability of opportunity for reward.
  - Used in discrimination and generalization studies.
Rat Operant Chamber
Types of Reinforcers

- **Primary** – innate reinforcing properties.
  - Example: something inherently pleasant such as food.

- **Secondary** – develops reinforcing properties through association with a primary reinforcer.
  - Example – money, grades, stickers.
  - Acquired through classical conditioning.
Strength of Secondary Reinforcer

Figure 6.3  The strength of a secondary reinforcer increases as a function of the number of secondary and primary reinforcer pairings during acquisition. The measure of the power of the secondary reinforcer is the number of responses emitted during the first 10 minutes of testing.
Types of Reinforcers (Cont.)

- **Positive** – an event added to the environment that increases likelihood of a behavior.
  - Example: food or money.

- **Negative** – termination of an aversive (unpleasant) event.
  - Example: headache goes away when you take aspirin.
Shaping

- **Shaping** – Speeds up training.
  - Also called *successive approximation procedure*

- A desired behavior may occur infrequently and thus have little chance to be reinforced.

- Behaviors similar to the desired behavior are rewarded, gradually increasing the desired behavior.
Steps in Shaping a Bar Press

- Step 1 – reinforce eating from the dispenser.
- Step 2 – reinforce for moving away from the dispenser (toward bar).
- Step 3 – reinforce for moving toward the bar.
- Step 4 – reinforce for pressing the bar.
Shaping a Bar Press Behavior

**Figure 6.4** Shaping a bar-press response in rats. In the initial phase, the rat is reinforced for eating out of the pellet dispenser (Scene 1). During the second phase of shaping (Scenes 2, 3, 4, and 5), the rat must move away from the dispenser to receive reinforcement. Later in the shaping process (Scenes 6 and 7), the rat must move toward the bar to receive the food reinforcer.
Shaping Social Behavior

- Parents typically reinforce only the final response, not successive approximations.
  - Children may become frustrated and give up before they can obtain reward.

- Shaping techniques – start with simple behaviors a child can perform.
  - Gradually introduce complex behaviors.
Schedules of Reinforcement

- When and how often reinforcement occurs affects learning.
- Two kinds of schedules:
  - When = interval schedules
  - How often = ratio schedules
- Each kind of schedule can be either fixed or variable.
Four Types of Schedules

**Figure 6.5** Samples of cumulative records of bar-press responding under the simple schedules of reinforcement. The slash marks on the response records indicate presentations of reinforcement: The steeper the cumulative response gradient, the higher the animal’s rate of response.
Interval Schedules

- **Fixed Interval (FI)** – reinforcement is available regularly after a certain amount of time goes by.
  - The behavior must still be performed.
  - Scallop effect.

- **Variable Interval (VI)** – the time that must go by before reward varies.
  - Described as an average time
Ratio Schedules

- **Fixed Ratio (FR)** – a specified number of behaviors must be completed before reward is given.
  - Post-reinforcement pause

- **Variable Ratio (VR)** – the number of behaviors needed to obtain reward is different each time.
  - Described by an average
Comparison of FR Schedules

Figure 6.6  Cumulative response records on various fixed-ratio schedules. Behavior is affected by the fixed ratio used during conditioning. The rate of response increases with higher fixed ratios, and the postreinforcement pause occurs only at the highest FR schedules.
Differential Reinforcement

- Reward is contingent on performing the behavior within a specified period of time.
  - Example: due dates for class assignments

- For interval schedules, reward is also contingent on behavior but the opportunity still exists after each interval ends.
DRH Schedules

- Differential reinforcement can be made contingent on a high rate of responding.

- May create a vicious circle:
  - Danger that the animal will give up if the high rate cannot be maintained.
  - If responding decreases, no reward will be obtained.
  - Without reward, the behavior decreases.
DRL Schedules

- Reinforcement is contingent on a low rate of responding.
  - Animal is reinforced for withholding its behavior for a time, then showing it at the end of the period.
  - If a period goes by without a response then the response is shown, the reward is given.
DRL Schedule – Behavior Withheld

Figure 6.7  Relative frequency distribution of interresponse times (IRTs) in rats receiving reinforcement on a 10-second DRL schedule.
DRO Schedules

- Reinforcement is contingent on absence of a response during a specified period of time.
  - If a behavior is avoided entirely (e.g., hitting) then a reward is gained.

- This differs from DRL because in DRL the behavior must occur at the end of the period to gain reward.
Compound Schedules

- Two or more schedules are combined.
  - A rat must bar press 10 times (FR-10) then wait 1 minute (FI-1) before doing another bar press to get reward.
  - A dog must walk across a stage, pause in front of a mirror for 2 sec, then go continue walking (TV ad)
- Animals and humans are sensitive to such complexities.